reduced above and usually canescent, and its normally racemiform panicles of rather small violet heads with silky-canescent involucre. The common Florida form has comparatively large heads and a longer involucre than specimens from other localities, and the phyllaries are usually notably broad and with conspicuous herbaceous tips; forms occur in Florida, however, with the phyllaries of the equally long involucre decidedly narrow and loose, or almost squarrose. The occurrence of similar specimens with long involucre and broad phyllaries at other points in the range of the species (such as *Mackenzie* 3937, from Keasbey, Middlesex Co., New Jersey, and *Miss E. C. Clay*, from Kingston, Rhode Island, 1884), however, makes it inadvisable to distinguish the common Florida form varietally. A sheet of specimens in the National Herbarium from Bay Co., Florida, with the whole habit and the silky-pubescent achenes of the species but with practically glabrous stem and involucre is, on the other hand, so very different from all the other specimens examined that it merits distinction as a variety.

ASTER CONCOLOR L. var. **devestitus**, var. nov. Stem glabrous; lower leaves sparsely hispidulous especially toward margin, the others glabrous; phyllaries glabrous except for sparse ciliolation, their bases indurate, whitish, the shorter lanceolate or subulate herbaceous tips light green. FLORIDA: In dry sandy open soil, Lynn Haven, Bay Co., 13 Oct. 1921, *C. Billington* 80 (TYPE no. 1,116,195, U. S. Nat. Herb.).—S. F. BLAKE, Bureau of Plant Industry, Washington, D. C.

ON CHANGING THE DIRECTION OF SAP CONDUCTING TISSUES

J. FRANKLIN COLLINS

AMONG my unpublished records of experiments on chestnut trees are some that may be of interest to others working along similar lines. At this time it is intended to record briefly three experiments undertaken and completed nearly 20 years ago.

EXPERIMENT 1. OBJECT: To ascertain if a chestnut tree (No. 1663-A) could be made to develop a zig-zag grain in the wood by removing portions of the bark. METHOD USED: In 1910 several horizontal grooves a half inch wide were cut through the bark of a small smooth-barked chestnut tree. Each groove extended about two-thirds around the tree. The bark was removed from each groove,

leaving a strip of exposed wood a half inch in width. The center of the first groove was on the west side of the tree, the second on the east side, the third on the west side, etc., for some distance along the trunk. The ends of each groove dovetailed in between the ends of the two adjoining grooves, above and below. Each groove was separated from the adjoining one above and below by uninjured bark from four to six inches in width. RESULTS: When the tree died from the effects of the blight at the *base* of the trunk the following year the callus around the ends of the grooves was well-formed. When the bark was removed the grain of the newly formed wood was found to have developed a zig-zag course by passing around the ends of each groove.

EXPERIMENT 2. OBJECT: To ascertain if spiral conduction in a chestnut tree (No. 1654-A) could be induced, and if spiral grain in the wood resulted. METHOD USED: In the summer of 1910 a spiral groove about half an inch wide, from which the bark was removed, was cut around the trunk of a small chestnut tree. The spiral was at an angle of 30° to 45° from the normal longitudinal grain of the trunk. RESULTS: The following spring when the tree died as a result of the blight at the base of the trunk a well-marked callus had formed along the upper side of the groove. Upon removal of the bark it was found that the fibres of the newly formed wood and bark adjoining the cambium had the grain laid down in a nearly perfect spiral, parallel to the spiral groove cut in the bark the previous year.

EXPERIMENT 3. OBJECT: To determine the maximum angle that the grain of a chestnut tree trunk could be made to turn from the longitudinal by certain experimental methods. METHOD USED: In 1910 several small trees were selected and half inch grooves were cut through the bark in various ways so as to force the grain of the newly formed wood and bark to turn from the normal longitudinal direction to various angles up to 100°, provided the formation of wood and bast fibres continued. RESULTS: The following year the grain of the newly formed wood and bark was found to have frequently turned at an angle as great as 50° to 65° from the normal longitudinal line. At one point on one tree the grain had, for a distance of two to two and a half inches, turned almost at a right angle (i. e., 87°) from the perpendicular.

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